Report

Indigenous Biological Conservation of Medicinal Plant Resources the Itzamma Garden: Status and challenges

By Patrick Audet

Introduction;

The Itzamma Medicinal Plant Project is a collaborative conservation/agronomy initiative between the University of Ottawa, Cleveland State University, the Belize Indigenous Training Institute, and the Q'eqchi Traditional Maya Healers' Association focused on identifying, characterizing, and cultivating medicinal and/or traditionally important plants used by the Q'eqchi Maya. Located near the village of Indian Creek adjacent to the Mayan Mountain foothills of southern Belize, the Itzamma Ethnobotanical Garden represents a cornerstone of this project where endemic plant species are grown, cultivated, and used in regular practice for community primary health care (Ref.) by 9 healers of the Q'eqchi' Maya healers association . From a recent field expedition, we present here a biological survey of the Itzamma Garden describing the diversity, distribution, and abundance of medicinal species, as well as a description of development challenges and improvement strategies currently employed at the site.

Method

The biological survey was conducted via a coordinated grid-line mapping method. Strategic reference markers were dispatched throughout the site to triangulate the Garden's periphery and ecological features. GPS points were also noted for each marker. All lengths and relative width distances between cultivated rows were measured directly. The plant species lists were tabulated by cross-referencing folk names and voucher specimens from previous data-bases by

Bourbonnais-Spears et al. (2005) and Treyvaud-Amiguet et al. (2005). Information on the history, challenges and solutions to the cultivation issues were provided by

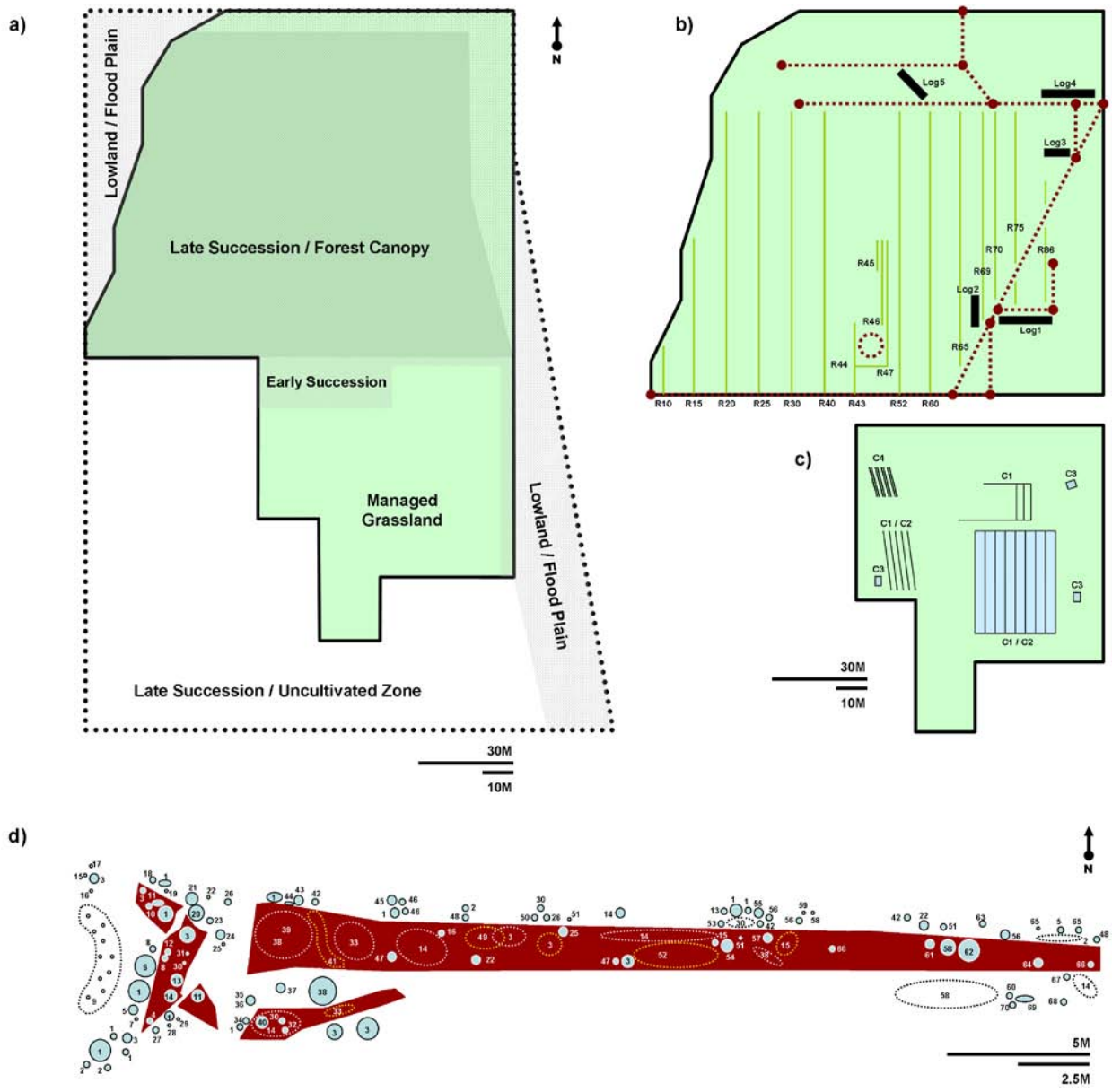
Results

Biological survey

Characterized as a mixed submontane and lowland broadleaved forest, the Itzamma Garden is a 70 acre site comprising over 130 cultivated medicinal plant species grown locally or transplanted from nearby regions (Table 1). In the wake of Hurricane Iris, the cultivated zones within the Garden are described as a mid- to late-succession forest (mainly 8 year old) canopy and managed grasslands surrounded by a seasonal floodplain due to the bordering Golden stream (Fig.1a). As member species originate primarily from upland localities, the majority of medicinal plants at the Garden are cultivated in the forest canopy zone which provides much needed shade and soil moisture (Fig.1b), whereas better adapted commercial cultivars such as chamomile and lemongrass are more prominent in the managed grassland which is exposed to high levels of sunlight and seasonal water drainage (Fig.1c). In this latter zone, medicinal plants have been successfully grown through intercropping with ornamental plants by providing added protection from desiccation; albeit, their growth and medicinal potency was found to be greatly reduced compared to those found in the canopy zone. For this reason, fruit trees are being planted at the periphery of the grassland to improve shade cover and promote the growth of early succession species. Moreover, an innovative feature at the Garden is the use of fallen trees for the cultivation of epiphytic plants. As shown (Fig.1d), moisture and nutrient rich logs harbor a high abundance and diversity of rare and often precarious species numbering well over 100 individuals, including many low bushes and runner vines.

Challenges and Solutions at the Itzamma garden

The Izamma Garden (created in 2000 and 2009) was an initiative of the traditional healers themeselves, who cited concern for disappearing wild species and the long travel required to collect medicinal plants in the Maya mountains. This is an initiative never attempted in the area previously and involved numerous challenges (Table 3). There was no protocol or methods to follow. Plants were collected with soil and roots in the Maya mountains during field trips by the healers. A high rate of mortality among transplanted species exists due to root disturbances, leaf desiccation and predation by leaf cutter ants. To meet these challenges, the healers are using irrigation with water from the adjacent creek to prevent dessication. Also, transplantation measures are being adapted making better use of shade trees. Since log resources are rapidly depleted in tropical ecosystems, careful considerations are being made for the construction of raised bed microcosms containing enriched soils for a more sustainable cultivation of epiphytic plants. For ant protection, the healers are using traditional ceremonies and intercropping methods. Peer reviewed literature has shown that the latter si effective in reducing a number of isnect pests. Other challenges were the inability of the project to attract a full time agronomist because of short term funding, which was ressolved by inviting volunteer Canadian plant scientists and increasign healer participation at the Garden. An unressolved issue, which is


a)
Lowland / Flood Plain
N
Late Succession / Forest Canopy
Early Succession
Managed Grassland
Lowland / Flood Plain
Late Succession / Uncultivated Zone
30M
10M
b)
Log5
Log4
Log3
R75
R70
R86
R45
R69
Log2
R46
Log1
R65
R44
R47
R10
R15
R20
R25
R30
R40
R43
R52
R60
c)
C4
C1
C3
C1 / C2
C3
C3
C1 / C2
30M
10M

d)
N
5M
2.5M

Figure 1.

Ecological survey of the Itzamma Ethnobotanical Garden at Indian Creek, Belize, C.A. The site's succession history (a) is shown outlining the cultivated (solid line) and uncultivated zones (dotted line), as well as the distribution of plant species (e.g. row cultivars and field plots) within the forest canopy (b) and managed grassland zones (c); the waking trails are represented as dotted lines. A précis of epiphytic plants associated with Log 1 (d) is shown where the species distributions and relative sizes are represented as solid circles and runner vines and bushes represented as dotted free-forms. The corresponding identification numbers for species taxons and Q'eqchi folk names are presented Tables 1 and 2.

Table 2. Log Epiphytes

Family	Taxon	Folk Name	I.D.
Acanthaceae	*Aphelandra scabra* (Vahl.) Sm.	Xilix	63
	Justicia aff.fimbriata (Nees) V.A.W. Graham	Jolom chakmut	63
	Justicia albobracteata Leonard	Xna' k'ejen	72
Adiantaceae	*Adiantum pulverulentum* L.	Sisb' k'itche'	50
	Pteris pungens Willd.	Rok' chitwan	9
Annonaceae	*Annona aff. glabra* L.	Jolob'ob'	23
Arecaceae	*Chamadorea* sp.	Xate'	48
Araceae	*Anthurium willdenowii* Kunth.	X ch'ich ma'us	25
	Anthurium sp.	Xtye' aj pu'	3
	Philodendron sp.	U'xb	61
	Syngonium sp.	Ruk' ma'us	13
	TBD	Letzeb / Sankil pim / Sankil kejen	31, 44
Asteraceae	*Matricaria recutita* L.	German Camomile	C3
	Mikania guaco Humb. & Bonpl.	Ra'an k'antyaj	10
	Neurolaena lobata (L.) Cass. sepi	Jackass Bitter	C2
	Vernonia stellaris La Llave & Lex.	Joblo' te'	74
	TBD	Bak'nel pim	65
	TBD	Juruch aj pak'	19
	TBD	Rax i juruch' aj pak'	51
Begoniaceae	*Begonia glabra* Aubl. var. Glabra	Pa' ulul	33
	Begonia heracleifolia Schltdl.& Cham.	Xak' pek	58*
Burseraceae	*Bursera simaruba* (L.) Sarg.	K'ajal	35
Cactaceae	*Wilmattea minutiflora* (Britton & Rose) Britton & Rose.	Chik babak'	11
Cucurbitaceae	*Gurania makoyana* (Lem.) Cogn.	K'um pim	8
Davalliaceae	*Nephrolepis biserrata* (Sw.) Schott.	K'uk mukoch	71, 52
Desconocida	TBD	Rax i ch'ajom k'ajam	18
Euphorbiaceae	*Acalypha arvensis* Poepp.	Kak' i uk'ub	69
Fabaceae-Caesalpinioideae	*Acosmium panamense* (Benth.) Yakovlev	K'an che' / K'an i che'	6, 46
	Senna hayesiana (Britton & Rose) H.S. Irwin & Barneby	Karabans' che'	59
Gesneriaceae	*Columnea sulfurea* Donn. Sm.	Kak' i pim / Cua' bon	76
Marcgraviaceae	*Souroubea gilgii* V.A. Richt.	Jub'ub	37
Melastomataceae	*Clidemia capitellata* (Bonpl.) D. Don. var dependens (D. Don.) J.F. Macbr.	Jix	32
	Hyptis verticillata Jacq.	K'otz / Ch'up i xim	75
Mimosaceae	*Acacia* sp.	Subin	40
Monimiaceae	*Mollimedia guatemalensis* Perkins	Chich' i mo'or	45
	Epiphyllum phyllanthus (L.) Haw. var strictum (Lem.) Kimnach	Sankil kejen	
Moraceae	*Dorstenia* sp.	X cua chak'bo' lai	17
Moraceae	*Dorstenia contrajerva* L.	Xak' pek	58*
Orchidaceae	TBD	Jolom k'an tyaj	41

Piperaceae	*Peperomia hispidula* (Sw.) A. Dietr.	Cui i xul	14
	Peperomia sp.	Cui ajawchan	15
	Peperomia sp.	Mai pim	30
	Piper aequale Vahl	Pu'chuch re'tzul	42
	Piper amalago L.	Tziri tok'	56

Family (cont'd)	Taxon (cont'd)	Folk Name (cont'd)	I.D.
Piperaceae	*Piper auritum* Kunth	U'bel	47
	Piper hispidum Sw.	K'an pom	1
	Piper peltatum L.	Tyut it	39
	Piper sp.	Pu' jix	16
	Piper sp.	Rax pu'chuch	43
Poaceae	*Cymbopogon* sp.	Lemon Grass	C1
Polygalaceae	*Securidaca diversifolia* (L.) S. F. Blake	Ch'up k'an tyaj	73
Rhamnaceae	*Gouania polygama* (Jacq.) Urb.	Ik'l / Ch'ajom kajam / X abon' kajam	60,62
Rubiaceae	*Hamelia patens* Jacq.	Chaj max	70
Schizaeaceae	*Lygodium heterodoxum* Kunze, *Lygodium venustum* Sw.	Ruxbi kaq	2
Selaginelliaceae	*Selaginella umbrosa* Lem. Ex Hieron.	Chok'l pim	70
Verbenaceae	*Hoffmannia* sp.	Rok' so'sol	5
	Adiantum wilsonii Hook.	Ruj i rak'i tza	55
TBD	TBD	Bisib k'ajam	21
TBD	TBD	Chakbo'li pim / Rix chakbo'li	4
TBD	TBD	Cho condo'	38
TBD	TBD	Ik'bo' lai pim	12
TBD	TBD	Jol jol	24
TBD	TBD	Jolom i posp	68
TBD	TBD	K'ak' i chok'l	66
TBD	TBD	Kak' i tzimaj	53
TBD	TBD	K'an uxb	49
TBD	TBD	Ku ku meka / Re'ak'	34
TBD	TBD	La'	28
TBD	TBD	Lok' ab'	54
TBD	TBD	Ojoj	20
TBD	TBD	Rix ik'bo 'lai	26
TBD	TBD	Rutzaj k'opopo'	7
TBD	TBD	Sak' i pajl	57
TBD	TBD	Sak' i tu' lux	64
TBD	TBD	Sak'l kuruz kix	29
TBD	TBD	Wukub k'ejen	67
TBD	TBD	X xabaj tza	27
TBD	TBD	Xab ajpak'	36
TBD	TBD	Xna' ichaj pim	22

*Folk name associated with more than one taxon
TBD – Taxon to be determined

Table 1. Row Cultivars

Family	Taxon	Folk Name	I.D.
Acanthaceae	*Justicia pectoralis* Jacq.	Xu kui kok	58
	Justicia sp.	Jolom chakmut	25,48,72,73, 75,77,84
Adiantaceae	*Pteris pungens* Willd.	Roq chiq'wan	19
Arecaceae	*Chamadorea* sp.	Xate	44,49,51,86
Araliaceae	*Dendropanax arboreus* (L.) Decne.& Planch.	Cojl che'	62
Begoniaceae	*Begonia glabra* Aubl.	Kaki pim	21*
Costaceae	*Costus laevis* Ruiz & Pav.	Tzu'un	15, 22, 23,40,61
Davalliaceae	*Nephrolepis biserrata* (Sw.) Schott.	Uq mockoch	46
Euphorbiaceae	*Acalypha arvensis* Poepp.	Kak uqub	34
Gesneraceae	*Columnea sulfurea* Donn. Sm.	Kaki pim	21*
Haemodoraceae	*Xiphidium caeruleum* Aubl.	Ix qwa ihquch	20
Loganiaceae	*Strychnos panamensis* Seem.	Krus / Kurus qix	36,37
Malvaceae	*Pavonia paniculata* Cav.	Jolom pich	43
Melastomataceae	*Blakea cuneata* Standl.	Xoi pim	55
	Clidemia capitellata (Bonpl.) D. Don. var dependens (D. Don.) J.F. Macbr.	Ixq pim	39
	Clidemia crenulata Gleason	Tzo pim	28
	Miconia sp.	Roq muqui	30
Monimiaceae	*Siparuna thecaphora* (Poepp. & Endl.) A. DC.	Chu che	50
	Mollimedia guatemalensis Perkins	Saki kejen	33,68,74
Myrtaceae	*Blakea cuneata* Standl.	Oxlaju Txajom	42
	Pimenta guatemalensis (Lundell) Lundell	Pens'	85
Piperaceae	*Peperomia tetraphylla* (G. Forst.) Hook. & Arm.	Puchuch retzul	29
	Peperomia sp.	Mai pim	57
	Piper aff. aequale Vahl	Puchuch rekanil	71,78
	Piper hispidum Sw.	Kan pom	14,16
	Piper schiedeanum Steud.	Marcus kejen / Tint it puchuch	18,56
	Piper tuerckeimii C.DC. ex Donn. Sm.	Cux sawi	66,67
	Piper yucatanense C. DC.	Tzulub pim	35#
	Piper sp.	Rax puchuch	79
Rubiaceae	*Gonzalagunia panamensis* (Cav.) K.Schum.	Chu che / Tzul che'	47,83
	Psychotria sp.	Koleras / Koleras k'aan	17,82
Schizaeaceae	*Lygodium venustum* Sw.	Ruxbi ka'ak	41,54
Selaginelliaceae	*Selaginella umbrosa* Lem. Ex Hieron.	Choq'l pim	65
Solanaceae	*Solanum megalophyllum* Dunal	Ix pim	27
	Solanum sp.	Iq kejen	31
Verbenaceae	*Adiantum wilsonii* Hook.	Ruj I raq'I tzi'	52,70
	Hoffmannia sp.	Rak so'sol	68b
Vitaceae	*Vitis tiliifolia* Humb. & Bonpl. ex Roem. & Schult.	Tzulub pim	35#
Zinginberacea	*Zinginger* sp.	Xan xir	1-13, C4

Family (cont'd)	Taxon (cont'd)	Folk Name (cont'd)	I.D.
TBD	TBD	Anx' akajam	53
TBD	TBD	Chak bo'lai pim	81
TBD	TBD	Ix uqil li pek	17
TBD	TBD	Kaq'l ukub	63
TBD	TBD	Ki'il pim	40
TBD	TBD	Mes i ja'	80
TBD	TBD	Mul tzi	43
TBD	TBD	Nink'l puchuch	60
TBD	TBD	Qu chim	32
TBD	TBD	Re'etaj tyajel	76
TBD	TBD	Roq tzilbu'ul	38
TBD	TBD	Roq tzulul	24
TBD	TBD	Rutzaj copopo'	64b,69
TBD	TBD	Telom pim	82
TBD	TBD	Wukub' kejen	64
TBD	TBD	X cua ribali choq'l	59
TBD	TBD	Xiq konej	45

*Folk name associated with more than one taxon

[#] Folk name associated with more than one taxon

TBD – Taxon to be determined

Table 3. Checklist of challenges and solutions at the Itzamma Ethnobotanical Garden

List of challenges	Solutions
Botanical garden is not a traditional form of agriculture; Successful cultivation methods yet to be established	Innovative use of habitats (e.g. logs, wetlands, shade trees, *etc*.) leading to successful establishment of medicinal plants
Medicinal plants are mainly upland forest species while garden is in lowlands close to villages	Use of cover trees and frequent watering to improve survival; Possible relocation of endemic species to upland sites
High transplantation mortality	Efforts made to minimize desiccation and reduce root disturbances
Leaf cutter ant damage	Traditional ceremony to reduce ant damage; Intercropping of species
Hurricane Iris (2001) destroyed trek-force building, reference collections and seedlings	World Bank, IPP, and IDRC aid to rebuild hurricane-proof facilities
Limited success of micro-enterprise commercial crops; Insufficient funds available to attract local agronomist	Local agronomist replaced with Research Volunteers; Increased Healer participation at Garden
Donation of land by the Government of Belize did not result in clear legal title to land	Unresolved